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TCS-84727/66
Sup. 1 SCR 288

SUPPLEMENT 1

TO

25X1A [redacted] REPORT SCR 288

November 7, 1966

TOP SECRET

Contents

I. RANGE OF ASSUMPTIONS AND IMPACT OF IIS

1. INTRODUCTION

A critique by NPIC of the conceptual design of the Integrated Information System, as described in [redacted] Report SCR 288, has produced numerous comments concerning the validity of assumptions both general and specific on which the concept is based. While general agreement among the critics exists on certain important points, an analysis of these comments often reveals as much divergence of opinion among the critics themselves as between the critics and [redacted] In view of the considerable discrepancy in imagery exploitation forecasts between the JIIRG and NPIC, perhaps this was to be expected as well as to inherently assure differences of opinion with [redacted] who did not have available the results of either forecast prior to publication of SCR 288.

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It is evident that at this point in time based on all the information at our disposal (both firm and speculative), that we can at best establish a range of assumptions which will bracket the projected workloads against which to base the IIS conceptual design. We have accordingly in the sections which follow, analyzed the JIIRG, NPIC, and [redacted] 288 forecasts and a new [redacted] forecast incorporating certain assumptions on which general agreement exists. The impact of the range of forecasts on the IIS concept is then reviewed and as will be shown throughout the range, does not alter the concept nor significantly change the quantitative data on equipment, files, and programs or data processing support personnel, facilities, and costs.

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2. RANGE OF ASSUMPTIONS

2.1 Rationale

As will be observed, the rationale for establishing the projected imagery exploitation requirements (number of PI's) by each estimating group differed from one another.

JIIRG's forecasts were based on the USIB planned collection program and developed from numbers of missions by vehicle type, number of targets per mission, number of hours per target by phase of readout, and annual hours PI productive capability.

NPIC forecasts were based on the USIB planned collection program and developed from numbers of missions, film footage per mission, number of hours per foot of film for readout, and annual hours PI productive capability.

25X1A [redacted] forecasts were based on a subjective assessment of increasing intelligence requirements resulting from improved collection technology such as better resolution and direct readout from satellites, and developed from geographic coverage, sub-division of targets, readout cycle, and annual hours PI productive capability.

2.2 Imagery Exploitation Requirements

The imagery exploitation requirements and the applicable underlying assumptions for each forecast are shown in Tables I, II and III. All data are for Fiscal Year 1971.

2.3 Correlation of Forecasts

If each forecast, regardless of rationale, were reasonably correct, i.e. embodied all pertinent factors and accurate measures thereof, then the results should perforce be consistent. Since the forecasts varied considerably, we endeavored to summarize significant factors where feasible for comparative purposes with the intention of using this comparison to modify the 25X1A [redacted] forecast only as thought to be appropriate. The Summary of Significant Factors is shown in Table IV.

25X1A 2.4 Modified [redacted] Forecast 25X1D

A revised forecast of image interpretation requirements is as shown in Table V. Because estimated readout hours per target include both Phase I and II readout, allocation of effort between phases is not given as in SCR 288. The assumptions and rationale necessary for deriving the revised requirements are indicated in the paragraphs that follow.

[redacted]

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The IIS personnel, computer programs, equipment and costs are shown in Table VII and are based on Table VI and the rationale given below:

a. Personnel

No significant change will occur in data processing support personnel over that estimated for [redacted]288. 25X1A

b. Central Computer Complex

25X1A No. of targets in target file for JIIRG and NPIC forecast is 71% of [redacted] forecasts representing a decrease of .51 x 10^9 bits. Increase of .5 x 10^9 bits is anticipated for "Objects File". Therefore, total storage ranges from 2.83 x 10^9 bits to 3.34 x 10^9 bits with no impact on computer complex.

c. PI Consoles

One console is allowed for each PI work station on the first shift for Phase I and II readout.

d. Mensuration Displays

An arbitrary estimate of 20 displays, one for each mensuration console in TID, has been made.

e. PI Mensuration Consoles

One console for every two work stations for scheduled (Phase I and II) readout.

f. SUSIE Consoles

Assume 25% of targets per day will require additional data by request. Assume 5 requests per target per day and an operator averages 30 requests per hour. Add 2 consoles for detailed reporting and other groups such as CSD.

g. Data Entry Devices

Based on peak number of reports per hour and each device processing 60 reports per minute.

h. Edit Consoles

Based on peak number of reports per hour and two minutes editing time per report.

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TABLE VI

BASIC INFORMATION RELEVANT TO CONCEPTUAL DESIGN

	JIIRG	NPIC	[redacted]/SCR 288	[redacted]/MODIFIED
No. of PI's Required				
Phase I & II				
Satellites	163	161	353	304
Aircraft		23		
Other		98		
Total Phase I & II	163	282	353	304
Phase III	105	210	75	150
Keys	6	---	---	---
National Services	---	17	---	---
Support to Non-CIA Det.	---	7	---	---
Grand Total	274	516	428	454
No. of Targets in Data Base	36,000	36,000 (1)	50,800	50,800
No. of Targets Read Per Day	383(2)	383 (2)	2,900 (3)	751 (3)
No. of PI's on First Shift	163	282	200	169

(1) Assumed to be the same as JIIRG.
(2) 5 day work week.
(3) 7 day work week for priority I and II targets. 5 day work week for priority III and IV targets.

TABLE VII

IIS PERSONNEL, EQUIPMENT & COST RANGE

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No. of Units				Description	Total Annual Cost			
JIIRG	NPIC	SCR 288	MODIFIED		JIIRG $	NPIC $	SCR 288 $	MODIFIED $
114	114	114	114	Personnel				
				Equipment				
1	1	1	1	Central Computer Complex				
163	282	200	169	PI Consoles				
20	20	20	20	Mensuration Displays				
61	106	75	67	PI Mensuration Consoles				
5	5	5	4	SUSIE Consoles				
2	2	5	2	Data Entry Devices				
3	3	10	3	Edit Consoles				
3	3	10	3	Approval Consoles				
10	10	10	10	Page Layout Consoles				
2	2	2	2	Photocomposers				
20	35	25	21	High Speed Printers				
				Total Equipment Cost				
				Total Cost				

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i. Approval Consoles

Based on peak number of reports per hour and two minutes approval time per report.

j. Page Layout Consoles

Arbitrary assumption. See SCR 288.

k. Photocomposer

Require 2 to keep up with Page Layout Consoles.

l. High Speed Printers

Allow one for each 8 PI stations.

We conclude from this analysis that the alternative sets of assumptions do not have a significant impact on the proposed IIS conceptual design. Although the quantities of individual items of equipment vary by set, no item or its function is eliminated. Computer programs and data processing support personnel are not affected. Annual costs vary between [redacted]. Incremental facilities requirements vary from 10,880 to 11,405 square feet.

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This conclusion was not entirely unexpected since the system configuration and functions are derived mainly from first shift Phase I and II workloads. Where major differences in the amount of imagery are forecast, the larger workload is processed through multiple shift operation.

II. THE PREPARATION OF BRIEFING BOARDS AND NOTES

The Process Flow Diagram shown on Figure A-3 of [redacted] Report SCR 273 reveals that there are four basic processes currently undertaken by members of the Readout Team that must be accomplished if a briefing board is to be prepared. 25X1A

The first process involves the preliminary selection of briefing board candidates. As the referenced diagram indicates, this selection is supported by collateral data, national requirements and anticipated significant imagery and the Target Readout List. It is important to realize that this preliminary selection is undertaken before any imagery is available and can be considered as a process which is continually reviewing and updating possible briefing board subjects. The conceptual system described in SCR 288 would utilize this identification of potential briefing board subjects as an input to the target selection process. Refering to Figure 16 of SCR 288 "Target List Generation" certain of the data contained in the Target Requirements File will be attributable to a desire to review new imagery for use as briefing board material and certain of the targets which are scheduled for readout will be selected because they are briefing board candidates. This will be especially true if the current "mission" mode of readout becomes a more "continuous mode.

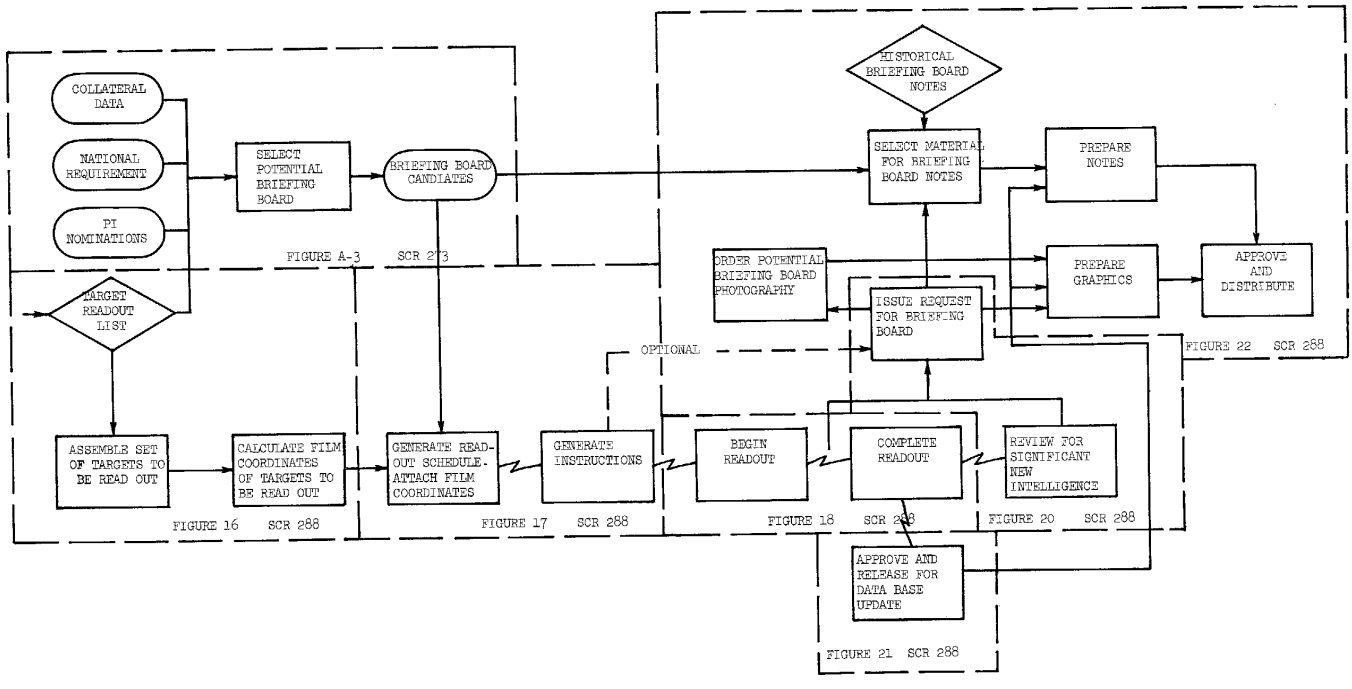
It is true at the present time that certain selected targets are rather preferentially treated during the readout cycle because of their briefing board potential. The system proposed in SCR 288 is quite capable of augmenting this treatment in many ways. The processes of Target List Generation and Target Assignment illustrated in Figures 16 and 17 of SCR 288 permit (and are structured to facilitate) the preferential treatments of certain selected targets. This entire preparatory phase has been devised to insure that all material necessary to properly interpret incoming imagery will be available when needed and that a proper co-ordinated scheduling of the readout has been accomplished. The proper film labeling and cutting, together with special annotations of the PI's work sheet will insure that a rapid review of imagery potentially suitable for Briefing Boards will be made.

The actual determination of the exact material that will be utilized as the basis for the briefing board is, of course, an intellectual activity which may however be supported by many of the features of the proposed system. In particular, Part "E" of the Target Data File contains in a continually updated file, a set of all briefing

board notes pertaining to each target. Since this material is available at all times, it can be extracted at the time briefing board candidates are selected and some advance preparation of appropriate notes, titles to be applied to the imagery, etc. can be done (at some risk of wasted effort) even before the imagery is received.

From the above discussion it is obvious that although final production of briefing boards occurs after the imagery has been read out, there is considerable work that can be accomplished in advance.

The essential parts of this process have been diagrammed in Figure 1 which combines the current procedure as shown in Figure A-3 of SCR 273 with the appropriate parts of Figures 16, 17, 18, 20, 21 and 22 of SCR 288.



NOTE: Broken arrows indicate that some intermediate steps have been omitted from the diagram. For complete detail, see SCR 288.

Figure 1. Briefing Board Process.

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III. PLAN FOR INCLUDING THE NATIONAL IMAGERY EXPLOITATION INFORMATION BASE (NIEIB) IN THE IIS CONCEPT

1. INTRODUCTION

A National Imagery Exploitation Information Base (NIEIB) containing six files necessary for the exploitation of imagery, information derived from imagery and information about imagery has been proposed. In this brief paper, we have examined each of these files in terms of their size, the methods which might be employed for their maintenance and the impact on the proposed concept of their inclusion in the IIS. We have assumed that even though two of the files may be maintained or coordinated by other groups, the actual physical storage of the information would be at NPIC.

2. FILE SIZES

a. Installations Data File (IDF)

This file is essentially the same as the Target Data File (TDF) described in SCR 288 with the following exceptions:

(1) The IDF contains "Essential Elements of Information (EEI's)" which were not included in the TDF except as they occur in the specific readout requirements stored and reported in Part "A" of the TDF.

(2) The IDF would also receive inputs from sources other than NPIC. However, only when such additional information was at variance with data already in the file would it represent an increase in file size.

A number of factors affect the size of this file; the total number of targets, the volume of data concerning each target, the frequency with which new data is added to the file and the degree of file compaction that can be obtained through careful formatting. The degree of uncertainty which is present in all of these variables makes an accurate measure of the size of this file impossible. The total number of targets postulated for the IIS is consistent with that postulated for the IDF. Assuming as much information is received from outside which is at variance with that already in the file, total data in the TDF file might increase by $\frac{1}{3}$ bringing the total file size to 24×10^8 bits.

b. Objects Data File (ODF)

Our original estimate on the size of this file assumed 1,000 main entries (i.e. classes of objects). We assume this file will be used primarily by the PI as an aid in object identification. Information received from comments on SCR 288 indicates that the ODF might describe as many as 10,000 objects. The original estimate has therefore been increased tenfold to 6×10^8 bits.

c. Area Coverage Data File (ACDF)

This file, which is to be maintained by DIA, consists of two parts, the first is basically a statistical record of what portions of the world have been imaged and the quantity (in square and linear nautical miles) of such coverage. This part is analogous to the present Mission Coverage Statistics File (which does not include tactical missions) with a present size of approximately 1.8×10^6 bits. By FY 1971, the size of this file (including tactical missions) can be expected to increase to about 1×10^7 bits. The addition of data to permit cumulative coverage plotting, if desired, would not significantly change this latter number.

The second part of the file is designed to produce historical information on the performance of missions against COMOR or PROL coverage requirements. It contains as main entries all COMOR or PROL targets, with past KH missions and coverage data listed against each target. Although all of this information is available in the TDF (IDF) it may be necessary, for rapid retrieval, to duplicate the information in a special file.

To estimate the size of this file, we must first consider the "backlog" of information from the 57 missions already flown and then consider a growth rate. In these estimates we have used the following basic assumptions:

(1) Target name can be coded in 20 characters.

(2) Mission number can be coded in 7 characters.

(3) Coverage can be coded as 1 character.

(4) There are currently 4,400 COMOR targets.

(5) The combined COMOR-PROL list will contain 15,000 targets.

(6) Each target is covered on 60% of the missions flown.

These assumptions lead to the following estimates of file sizes.

Present Size

4,400 COMOR targets x 20 char./target = 88,000 char.

60% coverage x 57 missions x 8 char./missions = average of 272 char./target

4,400 targets x 272 char./target = 1,196,800 char.

Total 1,284,800 char.
or ~7.8 x 10^6 bits

1967 Size

10,600 new target names (PROL) x 20 char./target = 212,000 char.

60% coverage x 45 mission numbers (buckets) x 8 char./mission = average of 216 char./target

15,000 targets x 216 char./target = 3,240,000 char.

1967 Increase = 3,452,000 char.

Total 1967 Size = 4,736,000 char.
or ~2.8 x 10^7 bits

1971 Size

Thereafter the annual increase is 3.24 x 10^6 characters or about 1.9 x 10^7 bits so that by 1971 the file size would be (2.8 x 10^7) + [3 x (1.9 x 10^7)] = 8.5 x 10^7 bits.

Thus the total size of the ACDF is the sum of the two parts or 9.5 x 10^7 bits.

d. Mensuration Parameters File (MPF)

The data called for in this file is the same as that planned for the Frame Ephemeris File in the IIS. It therefore represents no increase in the estimated size of this file, i.e. 57.1 x 10^6 bits.

e. Exploitation Products File (EPF)

This file has already been described in the IIS as the All-source Index. It therefore remains at 44.8 x 10^6 bits.

f. Imagery Interpretation Resource Information File (IIRIF)

This file, which is to be coordinated by COMEX, is to contain basic information on the application of National photographic imagery interpretation resources. Although the content of this file has not as yet been defined, we assume that the file will be comprised essentially of an inventory of imagery interpretation personnel, equipment and facilities, together with an indication of the utilization of these resources. To assure adequate space for its storage we have arbitrarily allocated 10^7 bits.

3. PROCEDURES FOR FILE MAINTENANCE

With the exception of the Installations Data File (IDF) and the Objects Data File (ODF) all of the files just described are rigidly formatted. Thus all new entries, comparisons and deletions on the four remaining files can be made through use of the Data Management Package of the IIS software. Data from any acceptable source (an Approval Console in the IIS concept) would be entered into the system, and a search made of the appropriate file for a comparable entry. If identical data is already in the file, the new entry is discarded. If no comparable data is already in the file, the new entry is stored in the appropriate location. If comparable but conflicting data is found in the file, both the proposed new entry and the previously stored conflicting entry are printed out on a high speed printer or console for human consideration and conflict resolution. If no resolution is possible, the new data, clearly tagged as to its source, is re-entered into the system and forced into storage without further comparison. This same procedure would also be used for the formatted portions of the IDF.

New "free-text" (e.g. remarks on installation description) to be entered into the IDF are not amenable to automatic validation and will require some form of manual interface with the IIS. In the simplest form, the originator would request hard copy of the appropriate sections of the TDF via a SUSIE or PI console and decide whether his proposed new entry should in fact become a part of the data base. (Note that the originator, in this sense, is someone with authority to use an Approval Console and thus can be considered to be responsible for his own decision.) If the new free text originates outside NPIC, it would be entered into a working file, comparable to the one from which PI reports are examined, for approval with final approval judgement being exercised by a responsible individual within NPIC.

The necessity for human intervention in the updating of the IDF is principally a function of the rigidity with which the file is formatted. The more rigid the format, the less the required intervention.

The Mensuration Parameters File (MPF) is the product of the Computation Package of the IIS. It appears that any conflicts between entries that might arise in this file could be mathematically justified. Of course, there is always the possibility of erroneous inputs but these should result in inconsistencies which could be readily resolved if brought to the attention of the originator.

4. THE EFFECT ON THE IIS CONCEPT

The impact of the NIEIB on the IIS is for the most part minimal. There is an increase in the size of the TDF and ODF and the possible addition of the ACDF and the IIRIF although these latter two files are not specifically NPIC responsibilities. It is not yet clear exactly what data must be in active storage and thus any projection of a change in the number of drums or discs would be premature. In other areas, there may be a need for two or three additional Approval Consoles and/or SUSIE Consoles and the personnel to man them. The following table updates and summarizes the Data Base Storage Estimates of SCR 288 Table VI.

Update and Summary
of TABLE VI in SCR 288

TDF	17.8×10^8	24×10^8
ODF	0.5×10^8	5.5×10^8
ACDF	-	0.9×10^8
MPF	0.6×10^8	0.6×10^8
EPF	0.5×10^8	0.5×10^8
IIRIF	-	0.1×10^8
Misc. Indices	0.5×10^8	0.5×10^8
Misc. Files	0.9×10^8	0.9×10^8
	2.1×10^9	3.3×10^9

5. IMPLEMENTATION PERIOD

The effort required to implement the NIEIB, over and above that required for the IIS as a whole, is principally a matter of additional file conversion or construction. It appears, therefore, that implementation of the TDF (IDF) can be completed by the initial implementation date of the IIS, provided format approval can be expedited. The MPF, ODF, and EPF are already planned for completion at that time.

The ACDF is a DIA responsibility and thus is not a matter of concern. The IIRIF, (if it is an NPIC responsibility) could probably not be implemented in automated form before 1970 since considerable coordination would be required on format and exact content.

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